

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Northern District

RECREATION USE SURVEY OF
INDIAN CREEK, PLUMAS COUNTY
1993

Technical Information Record ND-94-1

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This report was prepared to summarize information collected under Work Order 1501-0100 to document recreation and fishery enhancement provided by a revised operation of Antelope Reservoir. This report has received only limited review; it is intended for internal use and should be considered preliminary and subject to revision.

December 1994

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SUMMARY

A survey of streamside recreation along upper Indian Creek, Plumas County, was made in 1993. This survey was made to estimate the amount and types of recreation occurring with augmented flow conditions. The random sample survey combined roving use counts with interviews of anglers to gather information on recreation use, activities, visitor origin, and angler success.

There were an estimated 28,500 hours of recreation use on 11 miles of Indian Creek between Antelope Dam and Flourney Bridge from April 24 to November 15, 1993. The most frequently observed activities were camping, fishing, relaxing and gold seeking. Similar to past surveys, about 31 percent of the visitors and 38 percent of the anglers interviewed were from the northeast counties of California. This year the Sacramento Valley was also well represented, with 36 percent of the visitors and 35 percent of the anglers originating from those counties. Anglers caught about 1,900 brown trout, 1,000 rainbow trout, and 65 brook trout in 6,200 hours of fishing on the creek.

An estimated total of 1,000 hours of recreation occurred along the six miles of Indian Creek from Flourney Bridge to Shim Flat, Anglers censused reported they caught no fish, although fish population sampling in September 1993 showed that trout and other fish were present.

DESCRIPTION OF STUDY AREA

Indian Creek is a major tributary of the East Branch North Fork Feather River in Plumas County. The creek flows from Antelope Dam about 38 miles to its confluence with Spanish Creek near the junction of Highways 70 and 89, about 11 miles northwest of Quincy (Figure 1). The area has a rich history of gold mining, ranching, and lumber production. In recent decades, recreation use has increased rapidly, with water-related uses a major attraction. Employment in the area today is divided among services, government, and timber harvesting and processing. Indian and Genesee Valleys support large cattle ranches.

The survey reach included the 17 miles of Indian Creek beginning at Antelope Dam, elevation 4,900 feet, and ending at Shim Flat near Genesee Woods subdivision, elevation 3,600 feet. The 6-mile Genesee Valley reach was surveyed in 1990 and 1993 specifically to gather baseline information needed to evaluate a proposed stream rehabilitation project.

Below Antelope Dam, Indian Creek flows through a granitic canyon with stands of pine and fir, but short reaches are often meadowlike. It is closely followed by a paved road with wide pullouts for convenient stream access. A portion of the creek cuts through a deep and rugged canyon, accessible only by foot, before flowing into the upper part of Genesee Valley. All but the lower one mile of this reach is within Plumas National Forest.

Between Flourney Bridge and the mouth of Little Grizzly Creek (Genesee Valley), Indian Creek flows through private ranch lands generally closed to public use. The creek gradient is very low in this reach. Below Little Grizzly Creek, Indian Creek flows through a large wooded flat called Shim Flat, which is U. S. Forest Service property. A dirt road leads across the flat to the creek at several secluded points. Black oak, ponderosa pine,

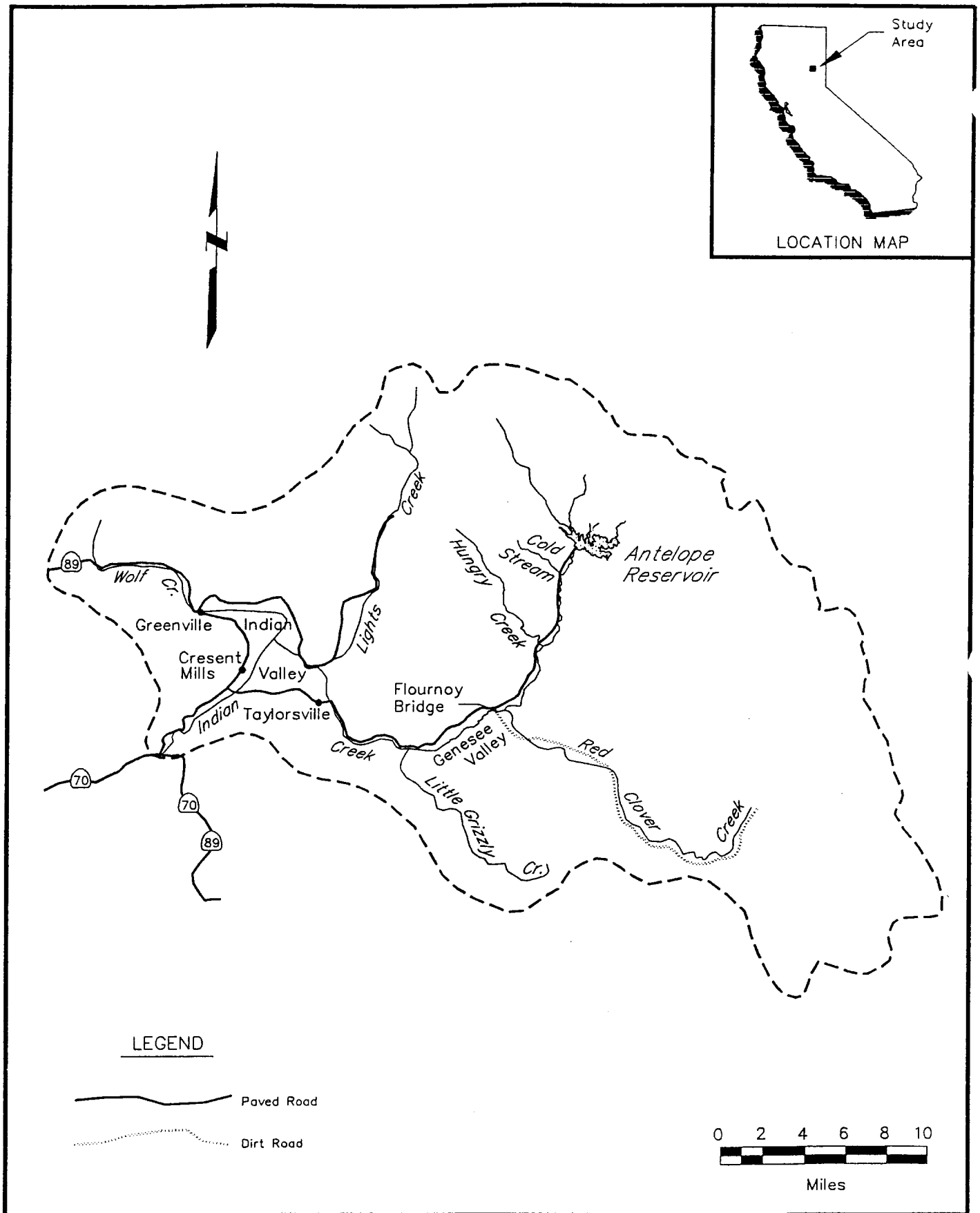


Figure 1 - Antelope Reservoir and Indian Creek,
Plumas County, 1993

and Douglas fir predominate. The paved county road only occasionally comes within sight of the creek in this reach and there are no developed recreation facilities. The only public access points are at Flournoy Bridge, Genesee Bridge, and Shim Flat.

The upper 11 miles of the stream remains cold in summer and is slightly turbid due to deep-water outflow from the dam. Brown trout and rainbow trout dominate the fishery. Many large trout (mostly rainbows, some browns and brooks) and small bass (mostly largemouth bass) entered the creek from Antelope Reservoir when it spilled in 1993. Brown bullhead have entered the stream during spills in past years, but only a few were present in 1993. A few bluegills (or green sunfish) were observed in 1993. Sacramento squawfish and Sacramento suckers also occur in the lowermost portion of this reach.

In the 6-mile Genesee Valley reach, Indian Creek is characteristically clear and cool, but can experience elevated temperatures on hot days. Typical summer minimum flows were approximately 30 - 40 cfs at Flournoy Bridge. This reach has good fishing at times in the early season for rainbow trout, Sacramento squawfish, and Sacramento sucker.

Antelope Reservoir filled and spilled in 1993, for the first time since 1989, for approximately 14 weeks. The release was controlled at 20 cfs throughout the rest of the summer and fall. Flow was reduced to 5 cfs for a week in September to allow fish population sampling.

METHODS

Recreation Use Counts

Use counts were made on randomly selected dates within ten survey strata using the optimum allocation method described by Abramson and Tolladay (1959). Thirty days of the 206-day period from April 24 through November 15, 1993, were surveyed; both days of the opening weekend of trout season, 5 of 9 holiday weekend days, 12 of 143 weekdays, and 9 of 50 general weekend days, and both days of the opening weekend of the general deer season. Five one-hour counts of recreation use were made in the study area each day at regular periods, scheduled according to the number of daylight hours (Appendices I and II).

The surveys were made from a vehicle or on foot, as necessary, to check access and recreation sites. Recreationists (and their vehicles) were counted and recorded by recreation activity. The five daily counts were totalled and multiplied by factors that accounted for recreation use during the daylight periods not counted. Similarly, the resulting daily figures were expanded to estimate total recreation hours for all days in each stratum. Adding the stratum totals provided an estimate of recreation hours for the study period.

Creel Census

Anglers along Indian Creek were contacted on 30 days to determine fishing success. The county of residence and length of time spent fishing so far that day was recorded for each angler contacted. Fish censused were counted, measured (fork length to nearest 0.5 centimeter [cm]), and identified to species.

To determine total catch, the catch per hour was multiplied by estimated hours of fishing for each stratum. Total weight of trout caught was calculated from estimated total catch and length-weight data from Indian Creek trout.

RESULTS

Recreation Use

Total recreation use on Indian Creek, Antelope Dam to Shim Flat, was estimated at 29,500 recreation hours (\pm 12,000 hours) for the period April 24 to November 15, 1993. More than 96 percent of this use was upstream of Flournoy Bridge. Based on counts of recreationists, camping was the major activity, followed by fishing, relaxing, and gold seeking (Table 1). Use counts reflect what recreationists were doing when seen and the number of hours spent on each major activity, but did not provide data on other activities that people pursued at other times during their stay.

Table 1. Recreation Hours by Activity, Indian Creek,
Antelope Dam to Shim Flat - 1993

<u>Activity</u>	<u>Recreation Hours</u>			<u>Percent</u>
	<u>Upper Indian Creek</u>	<u>Genesee Valley</u>	<u>Total</u>	
Camping	11,500	300	11,800	40
Fishing	6,200	100	6,300	22
Miscellaneous*	4,300	500	4,800	16
Relaxing	4,000	100	4,100	14
Gold Seeking	<u>2,500</u>	<u>0</u>	<u>2,500</u>	<u>8</u>
	28,500	1,000	29,500	100

* Includes beach use/swimming, sight seeing, children playing, and picnicking, walking.

In addition to the use counts, 209 interviews of recreationists were conducted during the 1993 season, representing 494 people. The interviews provided more detailed information on activity participation and additional information on visitor characteristics. About 54 percent of the recreationists interviewed said they fished during their visit to Indian Creek, and about

38 percent said they were relaxing. Other activities included swimming/wading (13 percent), gold seeking (12 percent), children playing (12 percent), sightseeing (11 percent), walking for pleasure (4 percent), and bicycle, and motorcycle or off road vehicle use (4 percent). About 6 percent of the people interviewed mentioned miscellaneous other activities. These percentages total over 100 percent because many recreationists engaged in more than one activity during their visit.

About 41 percent of the visitors camped along Indian Creek, 34 percent were day users and returned home at night, and 25 percent stayed overnight somewhere in the area, but not at Indian Creek. Most of these camped at Antelope Reservoir, but a few stayed with friends or relatives in the area, at motels or resorts, private campgrounds, or summer cabins.

Interesting results this year include the observation that more recreation visitors came from the Sacramento Valley counties (36 percent) than the northeast counties (31 percent). Although the percentages are similar, this proportion has been reversed in most past years (Figure 2).

Creel Census Data and Angler Success

During the 1993 trout season, 278 anglers were contacted. They had fished 815 hours, with a recorded catch of 201 brown trout (Salmo trutta), 125 rainbow trout (Oncorhynchus mykiss), and 9 eastern brook trout (Salvelinus fontinalis). In addition, a total of 138 other trout were reported caught, or reported to have been caught and released. Total angling use was estimated at 6,300 hours (\pm 1,700 hours) or 2,100 angler days, with an estimated catch of 1,900 brown trout, 1,000 rainbow trout, and perhaps 65 eastern brook trout. Based on reported catch and release, as many as 1,400 additional trout may have been caught and released. Other species of fish observed or reported to have been caught this year included bass (both smallmouth and large-mouth), bluegill/green sunfish and a brown bullhead. Angling use

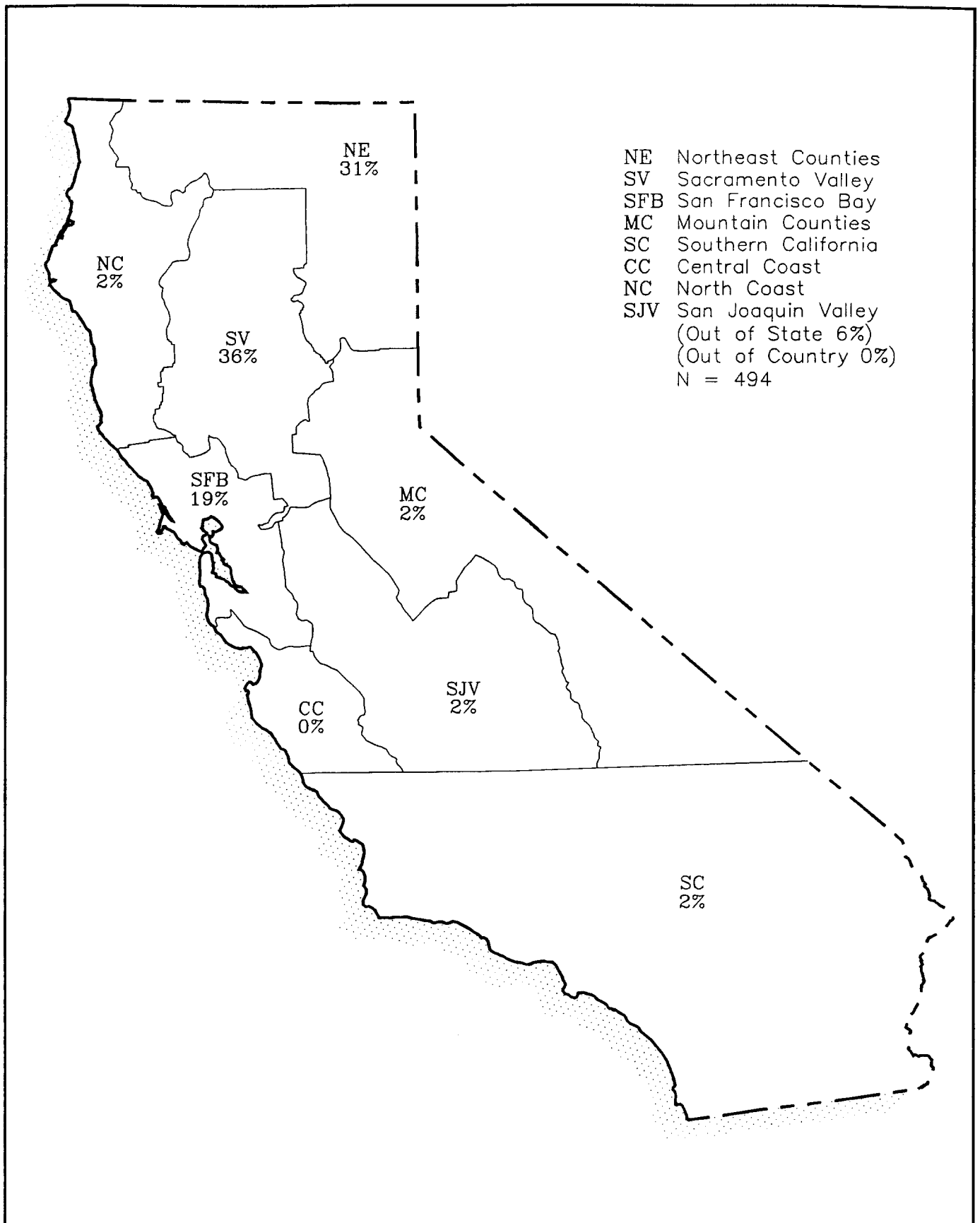


Figure 2 - Indian Creek Visitor Origin by County Groups
1993

in Genesee Valley, included in the totals above, was estimated at about 100 hours with no censused anglers reporting any catch. About 52 percent of the anglers censused fished with bait, 2 percent with lures, 10 percent with flies, and about 36 percent fished with some combination of these methods, mostly bait and lures.

The mean length of brown trout caught during 1993 was 22.6 cm (8.8 inches [in]) with a range of 13 to 40 cm (6 to 16 in) (Appendix III). The mean length of rainbow trout was 22.3 cm (12.3 in) with a range of 17 to 43 cm (6 to 17 in) (Appendix IV). An estimated 270 lb of brown trout and 240 lb of rainbow trout were caught.

Indian Creek angler origin was similar to previous years; most of the anglers came from the northeast counties, Sacramento Valley area, and the San Francisco Bay area (Figure 3).

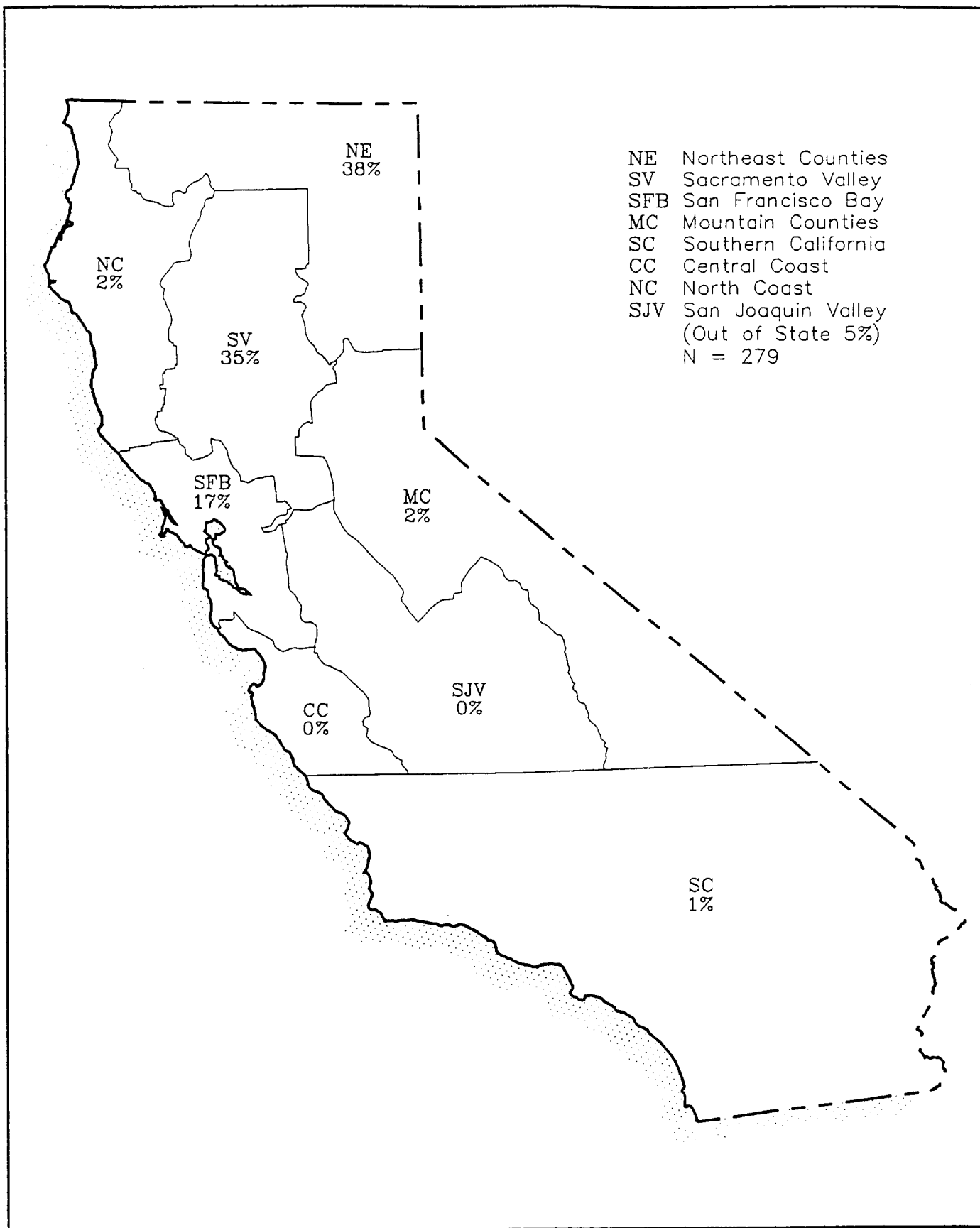


Figure 3 - Indian Creek Angler Origin by County Groups
1993

DISCUSSION

Understanding the limitations of the recreation use survey and creel census helps put the data obtained in perspective. This section describes the survey limitations and compares data from previous years with 1993 data.

Limitations of Use Counts and Creel Census

Most recreationists on the creek were readily observed during the use counts. Vehicle access points were checked on each count, but people were not found for some vehicles. Vehicles of U. S. Forest Service workers, loggers, and other non-recreationists often park along the road in this reach of Indian Creek, making vehicle counts a poor index of recreation use. We observed loggers, truck drivers, and U. S. Forest Service employees working along Indian Creek during the summer. We did not include them in the estimates of use because they generally did not engage in recreation along the creek. About 13 percent of the estimated fishing use was represented in the creel census.

Comparison of 1993 Results with Previous Surveys

The first three surveys of Indian Creek (1978-80) covered the entire stream. In 1981, 1982, and 1986, the survey included only the upper 11 miles of the creek. The current survey covered 17 miles from Antelope Dam to Shim Flat near Genesee Woods, as did the 1990 survey. A comparison of data from all eight years (Table 2) illustrates changes that have occurred in general recreation, fishing, and angler success in the upper reach (Antelope Dam to Flournoy Bridge).

Table 2. Estimated Recreation Hours by Activity,
Upper Indian Creek, 1978-82, 1986, 1990
and 1993^{1/}

Activity	Year							
	1978	1979	1980	1981	1982	1986	1990	1993
Fishing	7,000	3,400	8,800	3,600	13,500	7,600	6,200	6,200
Camping	5,600	7,700	8,000	4,500	14,500	9,700	5,700	11,500
Relaxing	4,200	5,200	2,600	2,000	3,000	5,300	1,300	4,000
Picnicking	300	500	700	800	1,400	200	100	100
Gold Seeking	300	200	400	1,600	600	1,900	1,300	2,500
Miscellaneous	<u>1,200</u>	<u>1,000</u>	<u>1,700</u>	<u>1,000</u>	<u>2,600</u>	<u>2,300</u>	<u>1,100</u>	<u>4,200</u>
Total	18,600	18,000	22,200	13,500	35,600	27,000	15,700	28,500

^{1/} Source: DWR Technical Information Report Nos. 79-1, 80-1, 81-1, 82-1, 83-1, 87-1, 90-1 and this report. This table includes only data for the upper 11 miles of Indian Creek, Antelope Dam to Flournoy Bridge.

The last two surveys of "middle" Indian Creek (Flournoy Bridge to Shim Flat; 1990, 1993) reflected similar total recreation use (Table 3). There appears to be large percentage differences for some of the individual activities, but this use is so low that such comparisons are not statistically meaningful. Comparisons of this reach to previous survey years (1977-80) is also not meaningful, due to the fact that in previous survey years the survey reach included Indian Creek all the way to Taylorsville Park.

Table 3. Recreation Hours by Activity, "Middle" Indian Creek,
Flournoy Bridge to Shim Flat - 1993

<u>Activity</u>	<u>1990</u>	<u>1993</u>
Camping	500	300
Fishing	400	100
Miscellaneous*	100	500
Relaxing	300	100
Gold Seeking	<u>0</u>	<u>0</u>
Total	1,300	1,000

* Includes beach use/swimming, sight seeing,
children playing, walking & picknicking.

Eight years of surveys, a period that included a wide range of streamflow conditions, have revealed that angling success is often higher and more anglers are attracted to Indian Creek in years when Antelope Reservoir spills and summer flows are maintained at 20 cfs, than in years with low flows (Table 4). Anglers know that rainbow trout leave the reservoir when it spills and fishing will be good downstream. The catch per hour and total catch of rainbow trout roughly reflect the number of trout entering the stream at the time of spill. Fishing success for brown trout normally remains about the same irrespective of angling pressure, however the catch rate in 1994 was unusually low. After spill ends, the higher maintained flows make the stream appear better for fishing and increased angler use continues. However, no convincing explanation can be offered for the low catch rate, essentially the lowest ever, observed in Indian Creek during 1994.

Table 4. Streamflow and Estimated Angler Use and Catch
Upper Indian Creek, 1978-82, 1986 and 1990^{1/}

Year	Streamflow Conditions	Angler Hours	Brown Trout		Rainbow Trout		Total Trout	
			# BN Caught	Catch/ Hour	# RT Caught	Catch/ Hour	# Trout Caught	Catch/ Hour
1978	Spill 46 days and 20 cfs	7,000	3,465	0.50	1,400	0.20	4,865	0.70
1979	Spill 20 days and 10 cfs	3,400	1,330	0.39	410	0.12	1,740	0.51
1980	Spill 177 days and 20 cfs	8,800	2,950	0.34	2,835	0.32	5,785	0.66
1981	No spill and 10 cfs	3,600	1,400	0.39	200	0.05	1,600	0.44
1982	Spill 237 days and 20 cfs	13,500	4,300	0.32	4,780	0.35	9,080	0.67
1986	Spill 123 days and 20 cfs	7,600	2,700	0.35	2,500	0.33	5,200	0.68
1990	No spill and 10 cfs	6,200	2,120	0.34	1,830	0.30	3,950	0.64
1993	Spill 102 days and 20 cfs	6,200	1,900	0.31	1000	0.16	2,965	0.46

^{1/} Source: DWR Technical Information Report Nos. 79-1, 80-1, 81-1, 82-1, 83-1, 87-1 and this report. This table includes only data for the upper 11 miles of Indian Creek, Antelope Dam to Flournoy Bridge. Total trout caught in 1993 includes an estimated 65 eastern brook trout.

The eight years of survey data have defined Indian Creek recreation and fishing quite well and also provided some interesting incidental information. Use is normally heaviest in the spring months and about 50 percent of the annual recreation and 60 to 75 percent of the fishing occurs by the end of June. The major activities are typically camping, fishing, and relaxing. Overall, the best fishing occurs before July. Fishing is usually best in the morning hours (before noon for both rainbow and brown trout, although evening fishing (after 4 p.m.) for brown trout is nearly as good. Morning and evening periods nearly always provide better fishing than mid-day.

Most of the exceptionally large fish observed in the creel census are caught on the opening weekend or early in the season. The opening weekend always has the highest angling use of the year, (typically 12-20 percent of the annual use) but often not the highest fishing success. Local anglers (Plumas and Lassen County residents) who presumably know Indian Creek better than other anglers are somewhat more successful in catching trout than residents of other counties.

ACKNOWLEDGEMENTS

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APPENDIX I

RECREATION SURVEY SCHEDULE FOR
INDIAN CREEK, PLUMAS COUNTY
APRIL 24, 1993, TO NOVEMBER 15, 1993

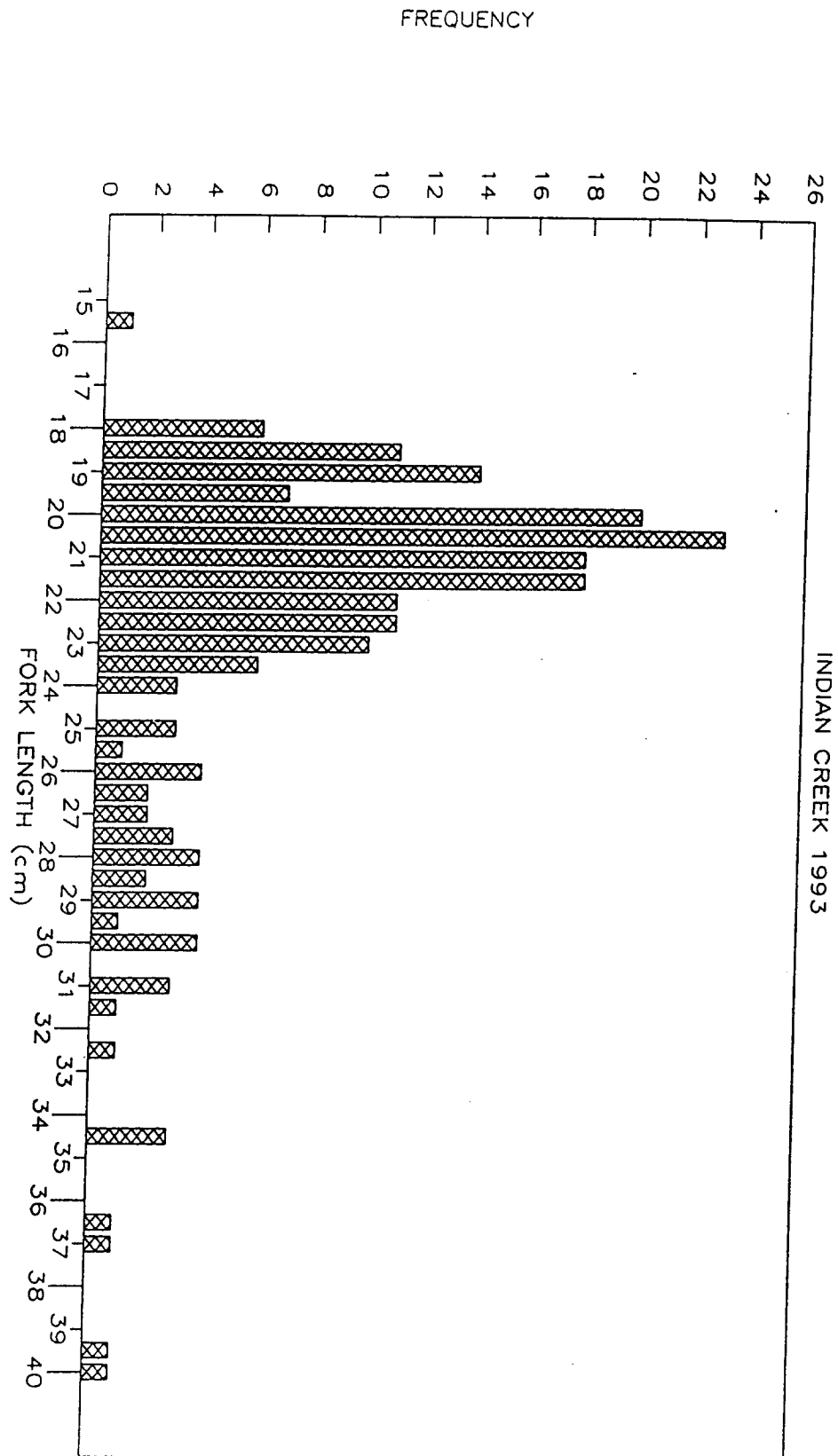
<u>Indian Creek Survey Dates</u>	Holiday = HD Weekend = WE <u>Weekday = WD</u>	<u>Survey Strata</u>
April 24	WE	I
April 25	WE	I
April 27	WD	IV
May 1	WE	III
May 11	WD	IV
May 13	WD	IV
May 18	WD	IV
May 30	HD	II
May 31	HD	II
June 5	WE	III
June 12	WE	III
June 20	WE	III
June 25	WD	IV
June 30	WD	IV
July 4	HD	IX
July 5	WD	IX
July 12	WD	VI
July 24	WE	V
July 25	WE	V
August 3	WD	VI
August 11	WD	VI
August 22	WE	V
August 27	WD	VI
September 4	HD	IX
September 14	WD	VIII
September 24	WD	VIII
October 2	WE	X
October 3	WE	X
October 16	WE	VII
November 7	WE	VII

APPENDIX II

1993 USE COUNT SCHEDULE FOR INDIAN CREEK

<u>Date</u>	<u>Daylight Hours</u>	<u>Use Count</u>		<u>Creel Census Time (approx.)</u>
		<u>Count</u>	<u>Time</u>	
April 24-25 PDT	15-1/2	1st	0730-0830	0800-1200
		2nd	1000-1100	1500-1900
		3rd	1300-1400	
		4th	1530-1630	
		5th	1830-1930	
May-August PDT	16-1/2	1st	0700-0800	0800-1300
		2nd	1000-1100	1400-1900
		3rd	1300-1400	
		4th	1600-1700	
		5th	1900-2000	
September PDT	14	1st	0730-0830	0900-1300
		2nd	1000-1100	1400-1800
		3rd	1230-1330	
		4th	1500-1600	
		5th	1730-1830	
October PDT	13	1st	0800-0900	0900-1300
		2nd	1000-1100	1400-1800
		3rd	1230-1330	
		4th	1500-1600	
		5th	1700-1800	
November PST	12	1st	0730-0830	0800-1200
		2nd	0930-1030	1300-1700
		3rd	1130-1230	
		4th	1330-1430	
		5th	1530-1630	

APPENDIX III CREELED BROWN TROUT INDIAN CREEK 1993



APPENDIX IV CREELED RAINBOW TROUT INDIAN CREEK 1993

